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Docket No. 50-333

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Mr. J. P. Bayne
Executive Vice President,
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123 Main Street
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Dear Mr. Bayne:

SUBJECT: NUREG-0737, ITEM II.F.1.4, CONTAINMENT PRESSURE MONITOR
ITEM II.F.1.5, CONTAINMENT WATER LEVEL MONITOR
ITEM II.F.1.6, CONTAINMENT HYDROGEN MONITOR

Re: James A. FitzPatrick Nuclear Power Plant

We have reviewed your submittals dated May 2, June 23, and July 12, 1983 and June 18, 1984 regarding TMI Action Plan Items II.F.1.4, "Containment Pressure Monitor," II.F.1.5, "Containment Water Level Monitor," and II.F.1.6, "Containment Hydrogen Monitor." The scope of our review included all requirements except for the criteria requiring that the equipment be environmentally qualified (Appendix B of NUREG-0737). This latter issue will be reviewed separately under the scope of the Commission's environmental qualification program.

As discussed in the enclosed Safety Evaluation (SE), we have concluded that the requirements of NUREG-0737, Items II.F.1.4, II.F.1.5 and II.F.1.6 have been met for the FitzPatrick facility. Therefore, we consider these items resolved.

Sincerely,

Original signed by/

Domenic B. Vassallo, Chief
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Enclosure:
Safety Evaluation

cc w/enclosure:
See next page

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07/25/84	07/25/84	07/25/84

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FACILITY OPERATING LICENSE NO. DPR-59

POWER AUTHORITY OF THE STATE OF NEW YORK

JAMES A. FITZPATRICK NUCLEAR POWER PLANT

DOCKET NO. 50-333

RELATED TO TMI ACTION ITEMS (NUREG-0737)

II.F.1.4 CONTAINMENT PRESSURE MONITOR

II.F.1.5 CONTAINMENT WATER LEVEL MONITOR

II.F.1.6 CONTAINMENT HYDROGEN MONITOR

1.0 BACKGROUND

By our letter of September 5, 1980 (Reference 1) to: (1) licensees of operating plants; (2) applicants for operating licenses; and (3) holders of construction permits; we issued a summary listing of all the approved TMI Action Plan Requirements. In November of 1980 we issued NUREG-0737, Clarification of TMI Action Plan Requirements (Reference 2), which specifies TMI Action Plan Items approved by the Commission for implementation. This Safety Evaluation (SE) addresses three of the TMI Action Plan Items, II.F.1.4,5,6.

2.0 SCOPE OF REVIEW

This SE addresses all the requirements of II.F.1.4,5,6 except the following:

(1) ENVIRONMENTAL QUALIFICATION OF EQUIPMENT

The scope of our review includes all the NUREG-0737 requirements except for the criteria requiring that the equipment be environmentally qualified (Appendix B of NUREG-0737 and Regulatory Guide 1.89). This issue will be reviewed separately under the scope of the Commission's environmental qualification program. In NUREG-0737, for each item the requirements are partly expressed in a list of clarifications. For each of items II.F.1.4,5,6, clarification (1) is a statement of the environmental qualification requirement. In this SE, Sections 3.2, 4.2 and 5.2 are verbatim copies of the clarifications in NUREG-0737, except that clarification (1) from NUREG-0737 has been omitted.

(2) IMPLEMENTATION SCHEDULE

The implementation schedule is being addressed by Confirmatory Orders, and is not included as part of this SE.

3.0 II.F.1.4: CONTAINMENT PRESSURE MONITOR SYSTEM (CPMS)

3.1 NUREG-0737 CPMS POSITION

A continuous indication of containment pressure shall be provided in the control room of each operating reactor. Measurement and indication capability shall include three times the design pressure of the containment for concrete, four times the design pressure for steel, and -5 psig for all containments.

3.2 NUREG-0737 CPMS CLARIFICATION

(1) Omitted as explained in Section 2.0.

(2) Measurement and indication capability shall extend to 5 psia (-10 psig) for subatmospheric containments.

(3) Two or more instruments may be used to meet the range requirements. However, instruments that need to be switched from one scale to another scale to meet the range requirements are not acceptable.

(4) Continuous display and recording of the containment pressure over the specified range in the control room is required.

(5) The accuracy and response time specifications of the pressure monitor shall be provided and justified to be adequate for their intended function.

3.3 SCOPE OF CPMS EVALUATION

The licensee has described his design for the CPMS in references from 3 on. Our review of the licensee's submittals consists of the following: (1) checking for deviations from our requirements which are stated in Sections 3.1 and 3.2 above, (2) reviewing the adequacy of the accuracy specifications of the CPMS, and (3) reviewing the adequacy of the response time specifications of the CPMS. The figures quoted herein for accuracy are three standard deviations, which represents a 99.7% confidence level. All accuracy figures are quoted as a percentage of full scale. The figures quoted for response time are the 100% response values. For linear transfer functions we are using the convention that the time for 100% response is four time constants.

3.4 LICENSEE COMPLIANCE WITH NUREG-0737 CPMS REQUIREMENTS

After reviewing the licensee's submittals, we find that the CPMS design meets all the requirements of Sections 3.1 and 3.2 above.

3.5 EVALUATION OF CPMS ACCURACY AND TIME RESPONSE

All CPMS channels installed at Fitzpatrick have readouts in the control room. The characteristics of these channels are enumerated in Table 1. These values, which are consistent with the present state of the art, will provide information over the intended range of the CPMS that is sufficiently accurate and useful to allow the plant operator to adequately assess pressure conditions within containment.

Table 1. Characteristics of the CPMS Channels

Channel Number	5A	5B	6A
Range (psig)	-5 to +5	0 to 250	0 to 1500
Post-DBE Indicator Loop System Accuracy (%)	1.4	1.4	1.4
Post-DBE Recorder Loop System Accuracy (%)	1.2	1.2	NA
Post LOCA/HELB Indicator Loop System Accuracy (%)	3.6	3.6	3.6
Post LOCA/HELB Recorder Loop System Accuracy (%)	3.6	3.6	NA
Indicator Loop Response Time (sec)	6.4	6.4	6.4
Recorder Loop Response Time for Small Transients (sec)	0.5	0.5	NA
Recorder Loop Response Time for Large Transients (sec)	4.0	4.0	NA

Note: DBE === Design Basis Event
LOCA == Loss Of Coolant Accident
HELB == High Energy Line Break (Steam Line)

4.0 II.F.1.5: CONTAINMENT WATER LEVEL MONITOR SYSTEM (CWLMS)

4.1 NUREG-0737 CWLMS POSITION

A continuous indication of containment water level shall be provided in the control room for all plants. A narrow-range instrument shall be provided for PWRs and cover the range from the bottom to the top of the containment sump. A wide-range instrument shall also be provided for PWRs and shall cover the range from the bottom of the containment to the elevation equivalent to 600,000 gallon capacity. For BWRs, a wide-range instrument shall be provided and cover the range from the bottom to five feet above the normal water level of the suppression pool.

4.2 NUREG-0737 CWLMS CLARIFICATION

(1) Omitted as explained in Section 2.0.

(2) The measurement capability of 600,000 gallons is based on recent plant designs. For older plants with smaller water capacities, licensees may propose deviations from this requirement based on the available water supply capability at their plant.

(3) Narrow-range water level monitors are required for all sizes of sumps inside the containment.

(4) For BWR pressure-suppression containments, the Emergency Core Cooling System (ECCS) suction line inlets may be used as a starting reference point for the wide-range water level monitors, instead of the bottom of the suppression pool.

(5) The accuracy requirements of the water level monitors shall be provided and justified to be adequate for their intended function.

4.3 SCOPE OF CWLMS EVALUATION

The licensee has described his design for the CWLMS in references from 3 on. Our review of the licensee's submittals consists of the following: (1) checking for deviations from our requirements which are stated in Sections 4.1 and 4.2 above, and (2) reviewing the adequacy of the accuracy specifications for the CWLMS. The figures quoted herein for accuracy are three standard deviations, which represents a 99.7% confidence level. All accuracy figures are expressed as a percentage of full scale.

4.4 LICENSEE COMPLIANCE WITH NUREG-0737 CWLMS REQUIREMENTS

After reviewing Fitzpatrick's submittals, we find that the CWLMS design meets all the requirements of Sections 4.1 and 4.2 above.

4.5 EVALUATION OF CWLMS ACCURACY

All CWLMS channels installed at Fitzpatrick have readouts in the control room. The characteristics of these channels are enumerated in Table 2. These values, which are consistent with the present state of the art, will provide information over the intended range of the CWLMS that is sufficiently accurate and useful to allow the plant operator to adequately assess water level conditions within the suppression pool and drywell.

Table 1. Characteristics of the CWLMS Channels

Sensor Location	Suppression Pool	Drywell
Range (feet of water)	30	100
Post-DBE Indicator Loop System Accuracy (%)	1.4	1.4
Post-DBE Recorder Loop System Accuracy (%)	1.2	1.2
Post LOCA/HELB Indicator Loop System Accuracy (%)	3.6	3.6
Post LOCA/HELB Recorder Loop System Accuracy (%)	3.6	3.6

Note: DBE === Design Basis Event
LOCA == Loss Of Coolant Accident
HELB == High Energy Line Break (Steam Line)

5.0 II.F.1.6: CONTAINMENT HYDROGEN MONITOR SYSTEM (CHMS)

5.1 NUREG-0737 CHMS POSITION

A continuous indication of hydrogen concentration in the containment atmosphere shall be provided in the control room. Measurement capability shall be provided over the range of 0% to 10% hydrogen concentration under both positive and negative ambient pressures.

5.2 NUREG-0737 CHMS CLARIFICATION

(1) Omitted as explained in Section 2.0.

(2) The continuous indication of hydrogen concentration is not required during normal operation. If an indication is not available at all times, continuous indication and recording shall be functioning within 30 minutes of the initiation of safety injection.

(3) The accuracy and placement of the hydrogen monitors shall be provided and justified to be adequate for their intended function.

5.3 SCOPE OF CHMS EVALUATION

The licensee has described his design for the CHMS in references from 3 on. Our review of the licensee's submittals consists of the following: (1) checking for deviations from our requirements which are stated in Sections 5.1 and 5.2 above, (2) reviewing the adequacy of the accuracy specifications for the CHMS, and (3) reviewing the adequacy of the hydrogen sample port placement for the CHMS. The figures quoted herein for accuracy are three standard deviations, which represents a 99.7% confidence level. All accuracy figures are expressed as a percentage of full scale.

5.4 LICENSEE COMPLIANCE WITH NUREG-0737 CHMS REQUIREMENTS

After reviewing the licensee's submittals, we find that the CHMS design meets all the requirements of Sections 5.1 and 5.2 above.

The CHMS has two ranges, 0% to 10% and 0% to 30%. It is presently set on the 0% to 10 % range. The hydrogen sensors have hydrogen indicators permanently affixed to them, but since these sensors are located in the containment this indicator is not of any value for post accident monitoring.

The CHMS is equipped with two readout devices in the control room, an indicator and a digital trend on one of the printers on the plant process computer.

The control room CHMS indicators are equipped with two alarms: (1) an alarm that sounds on a high hydrogen signal, and (2) an alarm that sounds if a malfunction in the CHMS is detected.

The CHMS historical record generated using digital trend on the plant process computer is not easily examined because this CHMS historical record will be sandwiched between a lot of other data on the plant process computer printer. However, the CHMS historical record would only be used in an analysis of events which would be performed after an accident, and would not be needed by the control room operator for making reactor control decisions following the accident. If the CHMS historical record for some time interval becomes important for performing this post-accident analysis, then the computer printout can be leisurely perused to extract the CHMS historical record. We judge the digital trend to provide a cumbersome record of the CHMS historical record, but one that is adequate for the uses this record is intended.

5.5 EVALUATION OF CHMS ACCURACY AND SAMPLE PORT PLACEMENT

The CHMS indicator and computer-recorder loops both have a system accuracy of 5% of full scale. This value, which is consistent with the present state of the art, will provide information over the intended range of the CHMS that is sufficiently accurate and useful to allow the plant operator to adequately assess the hydrogen concentration within the torus, drywell and containment.

The CHMS consists of two redundant trains, each capable of obtaining samples from three locations in the drywell, one location in the torus, and one location in the containment building. Sample ports for both trains are:

1 ------- Drywell -------- Lower Level -------- Elevation 276'6"

2 ------- Drywell --------- Mid Level --------- Elevation 310'6"

3 ------- Drywell -------- Upper Level -------- Elevation 343'6"

4 -------- Torus ---------------------------- Elevation 250'3"

5 --- Containment Building ------------------- Elevation 300'0"

The licensee states that locations for hydrogen sample ports have been selected to provide representative samples of the atmosphere in the three isolated chambers being monitored.

6.0 CONCLUSION

Based on the above evaluations, the licensee has met all the requirements of NUREG-0737 for items II.F.1.4,5,6 within the scope of the review of this SE as described in Section 2.0. We, therefore, find the design for these three items acceptable.

7.0 REFERENCES

(1) Letter from D. G. Eisenhut (NRC) to All Licensees of Operating Plants and Applicants for Operating Licenses and Holders of Construction Permits, 5 Sep 80. Subject: Preliminary Clarification of TMI Action Plan Requirements.

(2) NUREG-0737, "Clarification of TMI Action Plan Requirements," U. S. Nuclear Regulatory Commission, Nov 1980.

(3) Letter from D. B. Vassallo (NRC) to L. W. Sinclair (PASNY) dated 2 Feb 83. Subject: NRC Request for Additional Information (RAI) on the CPMS, CWLMS and CHMS.

(4) Letter from J. P. Bayne (PASNY) to Domenic B. Vassallo (NRC) dated 2 May 83. Subject: Response to the CHMS part of the RAI of Reference 3.

(5) Letter from J. P. Bayne (PASNY) to Domenic B. Vassallo (NRC) dated 23 Jun 83. Subject: Response to the CPMS and CWLMS parts of the RAI of Reference 3.

(6) Letter from J. P. Bayne (PASNY) to Domenic B. Vassallo (NRC) dated 12 Jul 83. Subject: Correct some misinformation in Reference 5.

(7) Letter from J. P. Bayne (PASNY) to Domenic B. Vassallo (NRC) dated 18 Jun 84. Subject: Elaborate on the information presented in Reference 5.